APPENDIX G4

ENERGY RESOURCES

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This appendix describes the impacts of the construction and operation of each drainage alternative on energy consumption within the study area.

G4.1 AFFECTED ENVIRONMENT

The electrical energy resources utilized within the study area are delivered through the electrical transmission and distribution system operated by Pacific Gas and Electric Company (PG&E). However, the ultimate source of electrical power generation within the California energy market can be from a mix of generating assets, including hydroelectric, nuclear, and coal-fired power generation, that are owned and operated by either PG&E or some other power-generating entity. Due to recent rulings by the California Public Utilities Commission to restrict Direct Access, purchased power would probably be provided by PG&E.

The location and size of the specific energy demand, and the subsequent impact on the energy resources, will vary from small, widely dispersed demands associated with multiple private consumers, to relatively large, concentrated demands associated with publicly owned pumping and water treatment facilities. It is anticipated that the energy requirements will be relatively constant on a daily, weekly, and seasonal basis. A constant energy demand is the most easily accommodated demand profile for an electrical power generator since it is predictable. Although the new demand will increase the overall capacity requirements for the region, it will be a base-load demand that is typically fulfilled using the most efficient power generating options available within the system.

G4.2 ENVIRONMENTAL CONSEQUENCES

This section describes how the construction and operation of the drainage alternatives would change the existing electric power consumption patterns within the study area.

G4.2.1 Key Impact and Evaluation Criteria

The key issues are the energy requirements for construction and operation of the drainage alternatives and how these requirements might affect local and regional energy supplies.

G4.2.2 Environmental Impacts and Mitigation

This analysis is based on reasonably expected outcomes from the implementation of each drainage alternative. Each of the alternatives would increase energy consumption within the study area due to construction and operation of the associated plants and equipment. Energy requirements for the construction of the alternatives would be temporary, lasting only for the duration of the construction period. However, power consumption due to the operation of each drainage alternative would result in a permanent, incremental increase in energy requirements.

G4.2.2.1 No Action

Under No Action, farmers would pursue individual actions related to local drainage control and reuse and cropping patterns. Energy would be required for small sump pumps used to locally convey drainwater. The pumps would be located throughout the study area in a dispersed

manner. The evaluated drainwater reduction options would not have a significant impact on the existing energy requirements.

The overall energy requirements for the limited irrigation system improvements and for ongoing drainwater reduction measures would be expected to increase within the study area over time due to the general growth of the irrigation improvements program. However, this incremental change would not be expected to exert a strain on the electrical power supplies in the region. This energy demand growth could be supplied by a number of power suppliers including PG&E and the alternative generators. As discussed in Section 5 of this report, the No Action Alternative is estimated to have a total energy requirement that is an order of magnitude lower than the other alternatives.

G4.2.2.2 Ocean Disposal

The Ocean Disposal Alternative would include an aqueduct that traverses mountains and would require piping and pumping systems for successful operation. The energy requirements during the construction phase of this alternative would be associated primarily with the fuel requirements of mobile construction equipment. This equipment would include diesel powered earthmoving, tunneling, and lifting types of machinery. The fuel would be supplied from local, commercially available sources that typically provide fuel for the transportation and construction industries. The energy requirements associated with construction activities would be temporary and are not expected to exert a significant strain on the regional supply of liquid fuels.

The Ocean Disposal Alternative is expected to have four regional water reuse facilities, and associated pumping stations, to reduce drainage flow within the study area and six additional pumping stations located at multiple points along the conveyance route. Energy required during the operating period of the project would be primarily associated with pumps used to convey drainwater through the collection system, aqueduct, pipes, and tunnels. This energy requirement is expected to increase the overall base-load power consumption within the study area. Although the overall incremental change in energy requirements from the operation of the Ocean Disposal Alternative are not expected to have a significant impact on the power supplies in the region, the added demand would be measurable and advanced planning would be required. In addition, critical process equipment is expected to have an emergency standby source of power, such as a diesel generator or a diesel drive motor. The estimated overall load total energy requirement for the Ocean Disposal Alternative is expected to be the largest compared to Delta Disposal and In-Valley Alternatives. Section 5 of this report provides a breakdown of the energy requirements for each major energy-consuming process associated with this alternative.

G4.2.2.3 Delta Disposal (Chipps Island and Carquinez Straits)

The key processes of the Delta Disposal Alternatives would include collection, treatment, and conveyance of drainwater. Energy would be required for the pumps to collect and convey the drainwater, and for the biological and chemical reactors and process equipment used in the selenium treatment facilities.

Similar to the Ocean Disposal Alternative, the energy requirements during the construction phase of the Delta Disposal Alternatives would be associated primarily with the fuel requirements of mobile construction equipment. This equipment would include diesel-powered earthmoving and

lifting machinery. The fuel would be supplied from local, commercially available sources that typically provide fuel for the transportation and construction industries. The energy requirements associated with construction activities would be temporary and are not expected to exert a significant strain on the regional supply of liquid fuels.

Each Delta Disposal Alternative is expected to have four reuse regional facilities and one treatment facility within the study area. In addition, each Delta Disposal Alternative has two pumping stations located outside the study area. Energy required during the operating period of the project is primarily associated with pumps and process equipment. The energy loads would be concentrated at these reuse and treatment sites and pumping stations. This energy requirement would be expected to be relatively constant and would increase the overall base-load power consumption within the study area and the vicinity of the pump stations. Although the overall incremental change in energy requirements from the operation of the Delta Disposal Alternatives is not expected to have a significant impact on the power supplies in the region, the added demand is expected to be measurable and advanced planning would be required. In addition, critical process equipment is expected to have an emergency standby source of power, such as a diesel generator or a diesel drive motor. Based on the energy requirement information provided in Section 5 of this report, the Delta Disposal Alternatives are expected to have about a total energy requirement that is about one half of the size of the Ocean Disposal Alternative.

G4.2.2.4 In-Valley Disposal Alternative

The In-Valley Disposal Alternative is expected to include key processes similar to the Delta Disposal Alternatives; however, it will include less drainwater conveyance. Energy would be required for the pumps to collect and convey the drainwater, and for the biological and chemical reactors and process equipment used in the selenium and reverse osmosis treatment facilities, and for pumps and other equipment at evaporation ponds and mitigation wetlands.

Similar to the Delta Disposal Alternatives, the energy requirements during the construction phase of the In-Valley Disposal Alternative would be associated primarily with the fuel requirements of mobile construction equipment. This equipment would include diesel-powered earthmoving and lifting machinery. The fuel would be supplied from local, commercially available sources that typically provide fuel for the transportation and construction industries. The energy requirements associated with construction activities would be temporary and are not expected to exert a significant strain on the regional supply of liquid fuels.

The In-Valley Disposal Alternative is expected to have four regional reuse facilities, two treatment facilities, two evaporation ponds, and two mitigation wetland facilities within the study area. Energy requirements during the operating phase would be associated with conveyance pumping, process equipment and reactors in the selenium and reverse osmosis treatment facilities, evaporation ponds, and a seasonal habitat manipulation within the mitigation complexes where pumping might be required to fill or drain wetland cells. This energy requirement is expected to be relatively constant and would increase the overall base-load power consumption within the study area. Although the overall incremental change in energy requirements from the operation of the In-Valley Disposal Alternative is not expected to have a significant impact on the power supplies in the region, the added demand is expected to be measurable and advanced planning would be required. In addition, critical process equipment is expected to have an emergency standby source of power, such as a diesel generator or a diesel

drive motor. The total energy requirement for the In-Valley Disposal Alternative is expected to be about the same as the Delta Disposal Alternatives. Section 5 of this report provides a breakdown of the energy requirements for each major process area of this alternative.

G4.2.3 Cumulative Effects

Cumulative impacts are those that result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The increase in demand for power associated with the drainage alternatives would occur in a larger region that is experiencing municipal and industrial growth. Operation of the alternatives, when combined with other anticipated growth in energy demand within San Joaquin Valley, would not result in a significant cumulative adverse effect.